

(OP 253) Silk Nanoparticles for Delivery of Human BMP-2 in Bone Regenerative Medicine Applications

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A tissue engineering approach combines the use of scaffold biomaterials, stem cells and growth factors. Bone morphogenetic proteins (BMPs) are growth factors that have sparked a great interest in tissue engineering due to their strong ability to promote new bone formation. Herein, we report the use of silk derived nanoparticles as carriers for delivery of human BMP-2. Silks are attractive biomaterials for tissue engineering due to its biocompatibility, slow biodegradability and excellent mechanical properties. Recombinant human BMP-2 was expressed in *Escherichia coli* and purified by affinity chromatography, showing bioactivity in human adipose stem cells. BMP2-containing silk particles were then prepared by a water-in-oil emulsion method. Scanning electron microscopy (SEM) revealed that silk formed nanoparticles of 100–200 nm in absence of BMP-2 and of 300–350 nm when BMP-2 was incorporated. Western-blot using an antibody against human BMP-2 allowed to detect that the growth factor loaded into the particles, and that it could be slowly released, maintaining the original BMP-2 conformation. In human adult adipose stem cells, the particles showed no significant cytotoxicity and an increase in alkaline phosphate activity. Ongoing research includes the study of particle size by Dynamic Light Scattering (DLS), release assays using FITC-labeled BMP-2 and FTIR analysis. Silk nanoparticles showed to be a promising option as biomaterials for the delivery

of bone growth factors such as BMPs for regenerative medicine purposes.